

Globalization, Human Resource Practices and Innovation: Recent Evidence from the Canadian Workplace and Employee Survey

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This study examines the triangular relationship that connects the degree to which a workplace is internationally engaged, the extent to which it innovates, and the human resource practices it adopts. By pooling various years of data from the Canadian Workplace and Employee Survey, a nationally representative data set, we found that certain practices, such as variable pay and autonomy training, are more likely to be used in international workplaces. We subsequently found that for an international workplace, the use of variable pay contributes very little to workplace innovation while autonomy training has a positive relationship with innovation.

Introduction

FIRMS CREATE COMPETITIVE ADVANTAGE in several ways. One of these is to expand internationally in order to enter newer and bigger markets. Another is to simply be more efficient. And yet another way is to be more innovative. Of course, many firms will follow a combination of these approaches if they have ambitions to be large and to keep growing. These strategies have been explored well in the literature on competitive advantage (Porter 1980, 1990). Many human resource management and industrial relations studies have focused on the role that workplace practices may play in increasing productivity (Ichniowski et al. 1996). Workplace human resource (HR) practices can contribute to competitive advantage not only by increasing productivity but also by facilitating workplace innovation. The empirical literature has

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paid relatively less attention to the triangular relationship that connects the degree to which a firm faces “international” pressures, the extent to which it innovates, and the type of HR practices it adopts. This paper identifies a number of HR practices that are more likely to be used in more international settings. These selected HR practices are then examined for their effect on a workplace’s ability to innovate.

The internationalization of firms is hard to grapple with in scientific terms. An international firm has been conceptualized in some previous studies as the degree to which foreign interests may own a firm. Others have emphasized the foreign share of a firm’s sales. Yet when we consider the pressures of globalization, a firm that is otherwise largely domestic in its ownership or sales could be experiencing “international” competitive pressures right at home. If the adoption of certain workplace HR practices is driven by competitive market pressures, then foreign ownership and sales alone cannot fully explain the extent of adoption and its subsequent impact on innovation. Thus, there is a need to conceptualize “internationalization” of firms in a more integrated way that measures a firms’ engagement with the international environment.

The international environment provides new opportunities and new challenges for workplaces in developed economies, such as Canada. The challenges include competing with firms that make use of very different production resources (i.e., cheap labor from developing economies). The opportunities include access to ever-larger markets and all the advantages that come with achieving economies of scale. By being innovative in both the workplace process and in the final product, Canadian workplaces may compete with foreign firms and develop the competitive advantage to pursue new international markets. The link between organizational internationalization and increasing levels of innovation has been identified already in the literature; see Baptista and Swann (1998) for a comprehensive review. This study examines the link between internationalization and innovation by investigating the HR practices that are used by workplaces with higher degrees of internationalization in their quest to innovate.

In the past, these relationships have not been explored to the desired extent in large part due to the lack of sufficient data. The Workplace and Employee Survey (WES) conducted by Statistics Canada in several years since 1999 provides a unique opportunity to investigate these relationships at the workplace level. This level of measurement is less aggregated than the level of the firm. Although this makes it a bit problematic for measuring firm-level outcomes, it allows for more accurate measurement of practices that are anchored to the workplace, and not the firm, such as HR practices.

The analysis is carried out in two stages. In the first stage we test the hypothesis that workplaces that are more internationally engaged are likely to have a different approach to HR management (HRM) policies compared to workplaces that are less international in their orientation. The main result to note here is that workplace internationalization has a significant positive impact on adoption of variable pay and training. In the second stage of the analysis, we investigate the proposition that international workplaces that adopt certain HR practices are more likely to be innovators in terms of new and improved workplace processes and products. We find HR practices by themselves may increase the likelihood of innovation but when used by international workplaces, variable pay is less likely to lead to innovation while training is more likely to lead to innovation.

This study contributes to the research literature in several ways. First, it uses a composite index of internationalization, developed by Walsworth (2007), which takes into account traditional measures such as foreign sales and foreign ownership and combines it with competitive pressures felt at the workplace level. This approach differs from existing multi-criterion indices, such as the Transnational Index (TNI) commonly used by the International Labour Organization, that only include readily observable indicators such as the degree of foreign sales, ownership, and employment. The TNI and others like it are unsuitable for measuring internationalization because they do not measure internationalization in a manner consistent with globalization. They ignore the perceived (self-reported) consequences and opportunities of globalization. An organization that is measured completely domestic by the TNI may be intensely engaged with international markets as a result of high levels of international competition and/or a growth strategy based on overseas expansion. For example, a workplace selling only to Canadian markets, solely located in Canada, and employing only Canadians is a completely domestic workplace, according to the TNI. This may be an inaccurate assessment; a workplace could be experiencing severe competition from foreign firms and may respond by adopting an international strategy, and therefore will not act as a purely domestic workplace. The complexity of globalization requires measures of internationalization to look beyond simple observable indicators such as sales, ownership, or assets for evidence of strategic international engagement.

Second, this study contributes to the research literature by establishing the empirical connection between internationalization and the likelihood of adopting certain HR practices. Furthermore, it also demonstrates that “international” workplaces that adopt certain HR practices are more likely to innovate. In doing so, this study adds empirical findings to a body of literature that is largely dominated by theoretical works.

Conceptual Framework

Once a workplace is identified as engaged with the international environment, what does this workplace do that is different than workplaces that are not interested in internationalization? The answer, as well as the analysis reported in the subsequent sections, is based on a single observation: As a workplace becomes more engaged with the international environment, it will need to innovate to survive; to this end, international workplaces will use a select group of HR practices designed to encourage employees to innovate.

The international business literature already draws a close link between organizational internationalization and innovation. Using the WES data, Therrin and Leonard (2003) showed that foreign ownership is positively related to a workplace's ability to innovate; this relationship is also found using firm-level data (Barlett and Ghoshal 1990). The connection between internationalization and innovation is rationalized in three ways: (1) international markets are diverse and in order to service them, firms must offer market-specific products; (2) international markets are often geographically dispersed, requiring innovative ways of getting the product to the market; (3) international markets are open to international competition, creating competition among firms that make use of very different production environments. This last point is compounded by the impracticality of competing with firms from the developing world based on cost. The common strategy of international firms with workplaces in the developed world is to compete based on product differentiation and quality, which requires a heightened commitment to innovation (Mitchell and Coles 2003). In this regard workplace innovation is understood to incorporate two aspects.

1. To improve or create a new product—to satisfy diverse market demands and differentiate from competition.
2. To improve or create a new workplace process—to compete with lower-cost competition and adjust to geographically dispersed markets.

Success in either aspect is understood as workplace-level innovation.

Knowledge accumulation is, according to the literature, one of the most important characteristics of innovation (Rosenberg 1994). The accumulation of knowledge comes from complex and dynamic interactions between the workplace's own internal innovation capacity and external expertise. A firm's knowledge is largely embodied in its workforce. For example, engineers and scientific workers have scientific and technical knowledge, production workers have pragmatic knowledge, and managers, in addition to their knowledge of

internal operations, have access to knowledge through their networks with external partners, such as clients, suppliers, and researchers. All of these types of knowledge enhance the workplace's internal innovation capacities. Therefore, retaining workers as well as keeping them highly motivated are critical factors to assure continuity in the knowledge-accumulation process leading to innovation (Therrin and Leonard 2003). To encourage its internal workforce to innovate a workplace, financial incentives may be used, such as compensation schemes, as well as nonfinancial benefits, such as employee involvement practices and specialized training programs. These methods are known as high performance workplace practices (HPWP), and although a growing literature has studied the impact of such practices on organizational productivity, only a few have looked at their impacts on innovation performance.

A concise list of workplace practices that can be grouped under HPWP does not exist. However, most agree with Handel and Gittleman's (2004) recent review that as a bundle, they satisfy three conditions.¹

1. Job tasks in high-performance workplaces have greater variety and skill than traditional taylorized jobs, often involving formal job rotation schemes and delegation of responsibility to less-skilled workers.
2. Employees participate in problem solving and organizational decision making, particularly through formal teams and in the area of quality improvements. These organizational changes usually require a greater focus on training for employee development.
3. These practices are frequently supported by nontraditional compensation systems, such as merit pay, profit sharing, and group and individual productivity pay.

From this framework it is deduced that international workplaces will pursue an innovation strategy by shaping their HR practices to develop employee skill, increase employee autonomy, coordinate income with merit/performance, and generally demonstrate greater commitment to employees. These strategic HR priorities are organized in this study in the following three groups.

1. Variable pay is designed to attach the individual employee's income to the workplace's desired outcomes. Thus, attaining active cooperation and employee autonomy as individual contributions

¹ For similar conceptions of HPWP see Cappelli and Rogovsky 1994; Osterman 1994; MacDuffie 1995; Ichniowski, Shaw, and Prennushi 1997; Applebaum, Berg, and Kalleberg 2000; and Cappelli and Carter 2000; Black, Lynch, and Krivelyova 2004.

to productivity/profit are measured and rewarded. This is accomplished through incentives for group and individual productivity. A heightened commitment to workplace goals is considered crucial for innovation.

2. Conceptual training is intended to provide employees with a sense of autonomy while connecting them to the product and providing a supportive environment for team collaboration. This is deemed a higher level of sophistication in the training focus. Employees are encouraged to develop the sophisticated skills/knowledge and cultures required for conceptual labor (i.e., innovation).
3. Employee involvement programs are designed to support and encourage the necessary culture for innovation. This is achieved through providing the employee with the organizational autonomy to pursue new ideas individually or in a group setting while tying them to organizational goals.

Workplaces pursuing an international competitive advantage are considered to have the above three HRM foci. In this study they are collectively referred to as HPWP.

To sum up and to make the causal relationship between internationalization, innovation, and HPWP clear, two main relationships are tested in this study. First, international workplaces are more likely to use the defined HPWP. Second, these same HPWP are associated with higher levels of innovation. These relationships are stated more clearly in the following two hypotheses.

Hypothesis 1: Workplace internationalization is positively related to the use of HPWP.

Hypothesis 2: Even after controlling for the workplace internationalization, the use of HPWP is positively related to the propensity to innovate.

These theoretical relationships are tested in a unique data set that uses the workplace as a level of analysis.

Research Design

This section describes the empirical analysis used to test the hypotheses listed in the previous section. It does so in the following order: The data and sample is described, followed by an account of the construction of the

measures serving as proxies for workplace internationalization, HR practices, and workplace innovation. Finally the analysis plan is described.

The common study in the HRM literature uses the firm as the level of analysis. This method generally aggregates several workplaces, in possibly several different countries, under a single firm observation. This has the advantage of examining an effect across an entire firm in different business units and/or geographic regions. On the other hand, a workplace level of analysis is useful for studying observations that vary from workplace to workplace within a single firm, such as HR practices. To examine the workplace as a level of analysis, this study uses a unique workplace-level data set.

The WES collects information on 642 variables from 6271 from the same workplaces each year since 1999. The most recent data is from 2002. About half of the variables are used every year while the rest are rotated in every second year. Its population is all private sector workplaces in the ten provinces of Canada, excluding agricultural and primary industries. The WES was created to facilitate a wide range of workplace research areas. Theoretical considerations make it prudent to create a subsample. Three filters are applied to achieve this end. Workplaces that did not meet the criteria were dropped from the sample. The three filters are:

1. The workplace has ten or more employees. It must be sufficiently large to justify the effort and cost in creating and administrating HRM strategy.
2. The workplace has completed one fiscal year. Start-up strategy is different than sustainable HRM strategy and is not of research interest.
3. The workplace is part of a for-profit organization. The profit motive is a crucial assumption in HRM strategy.

After the filters are applied and workplaces that left the sample at some point between 1999 and 2002 are accounted for, the sample has 2798 cases remaining.

Measuring Workplace Internationalization. A previous study (Walsworth 2007) using the WES data creates and validates a composite index of workplace internationalization that takes into account traditional measures such as foreign sales and foreign ownership, and combines it with competitive pressures felt at the workplace level. This index is refereed to as the degree of workplace internationalization (DWI) index and is used as a proxy for workplace internationalization in the WES data. The four input variables

are: (1) international sales as a percentage of total sales; (2) foreign ownership as a percentage of total ownership; the remaining two measures of the DWI index are self-reported measures; (3) importance of international competition; and (4) importance of expanding into new geographic regions. The four input variables have been normalized² and summed to create an index. Equation 1 demonstrates the calculation using the mean value of the input variables.

$$\begin{aligned}\text{DWI index} &= \text{sales} + \text{ownership} + \text{competition} + \text{markets} \\ &= 0.08 + 0.08 + 0.23 + 0.38 \\ &= 0.75\end{aligned}\tag{1}$$

The four variables of the DWI index are ratios with values ranging from 0 to 1. Since the index is the summed result of the four variables, its range is zero (a completely domestic workplace) to four (a highly international workplace). The values of the input variables and the DWI index are also reported in Table 1.

Measuring HR Practices. Three measures of HR practices are created. An international workplace is hypothesized as emphasizing variable pay, training that focuses on conceptual development and employee involvement programs. A measure for variable pay is created as an averaged index of four dichotomous variables; the workplace offers the following components as part of the compensation package: individual productivity incentives, group productivity incentives, profit sharing, and merit pay. A measure for training sophistication is created in the form of an averaged index of four dichotomous variables; the workplace offers the following training programs: leadership, group problem solving, team building and communication, and professional development. Each of these four variables is created by combining two different aspects of the variable (in-class training and on-the-job training). A measure for employee involvement is created in the form of an averaged index of five dichotomous variables; the workplace offers the following programs: employee suggestion, job design, information sharing, problem solving, and self-directed work groups. The WES only includes these HR variables in the 1999 and 2001 data files. The values for both years are reported in Table 1.

² The measures for importance of expanding into new geographic markets and the significance of international competition are scale measurements. They have been standardized into ratios by dividing the response by the number of possible responses. For example, the importance of expanding into new geographic markets is measured on a scale of 0 to 5. There are six possible responses. The mean response is 2.28. It is converted into a ratio as follows: $(2.28/6 = 0.38)$.

TABLE 1
DESCRIPTIVE STATISTICS FOR THE INDEPENDENT VARIABLES

Issue	Variable	Min	Max	1999 Values			2001 Values		
				Mean	SD	N	Mean	SD	N
Degree of workplace internationalization (DWI)	Imp. of international competition	0	1	0.23	0.30	2628	0.22	0.30	2665
	Imp. of expanding into new geo. markets	0	1	0.38	0.32	2798	0.39	0.33	2798
	International sales as a percent of total	0	1	0.08	0.21	2798	0.08	0.21	2798
	Foreign ownership as a percent of total	0	1	0.08	0.27	2492	0.09	0.27	2798
	DWI Index	0	4	0.75	0.76	2371	0.79	0.71	2665
Variable pay Dummy variables 1 = yes 0 = no	Individual productivity incentive component	0	1	0.46	0.50	2798	0.45	0.50	2798
	Group productivity incentive component	0	1	0.16	0.37	2798	0.17	0.38	2798
	Profit-sharing component	0	1	0.16	0.37	2798	0.17	0.37	2798
	Merit pay component	0	1	0.33	0.47	2798	0.27	0.45	2798
	Variable pay scale (1999 α 0.55; 2001 α 0.59)	0	1	0.28	0.28	2798	0.27	0.27	2798
Training Dummy variables 1 = yes, 0 = no	Training for leadership	0	1	0.38	0.48	2798	0.38	0.49	2798
	Training for group problem solving	0	1	0.17	0.38	2798	0.15	0.38	2798
	Training for team building and communication	0	1	0.28	0.45	2798	0.24	0.43	2798
	Training for professional development	0	1	0.27	0.44	2798	0.23	0.42	2798
	Training scale (1999 α 0.73; 2001 α 0.74)	0	1	0.28	0.45	2798	0.25	0.31	2798
Employee involv. Dummy variables 1 = yes 0 = no	Employee suggestion program	0	1	0.30	0.46	2602	0.31	0.46	2687
	Flexible job-design program	0	1	0.29	0.45	2602	0.20	0.40	2687
	Employee information-sharing program	0	1	0.48	0.50	2602	0.45	0.50	2687
	Team problem-solving program	0	1	0.26	0.44	2602	0.21	0.41	2687
	Self-directed work group program	0	1	0.11	0.32	2602	0.09	0.28	2687
	*Ee involvement Scale (1999 α 0.69; 2001 α 0.64)	0	1	0.29	0.29	2602	0.25	0.27	2687
Business strategy scale 0–5, 0 = not imp.	Importance of R&D	0	5	1.43	1.64	2798	1.33	1.59	2798
	Importance of developing new products	0	5	2.12	1.74	2798	2.06	1.71	2798
	Importance of dev. new production techniques	0	5	2.06	1.60	2798	2.01	1.62	2798
	Importance of total quality management	0	5	3.00	1.49	2798	3.05	1.51	2798

<i>5 = crucial</i>	Importance of improving product quality	0	5	3.60	1.21	2798	3.53	1.33	2798
	Importance of improving employee skills	0	5	3.30	0.95	2798	3.11	1.09	2798
	Importance of increasing employee involvement	0	5	3.01	1.13	2798	2.90	1.13	2798
	Imp. of improving coord. customers/suppliers	0	5	3.04	1.33	2798	2.88	1.43	2798
	Imp. of improving measures of performance	0	5	3.09	1.21	2798	3.00	1.22	2798
	Bus. strategy scale (<i>1999 α 0.55; 2001 α 0.59</i>)	0	5	2.74	0.91	2798	2.63	0.97	2798
Numerical flexibility controls	Permanent employees as a percent of total	0	1	0.93	0.17	2798	0.96	0.12	2798
	Full-time employees as a percent of total	0	1	0.78	0.25	2798	0.76	0.28	2798
	Perm. full time employment ratio	0	1	0.86	0.17	2798	0.86	0.16	2798
Industry controls	Primary industries	0	1	0.01	0.11	2798	0.01	0.12	2798
	Tertiary industries	0	1	0.05	0.23	2798	0.05	0.023	2798
	Primary manufacturing industries	0	1	0.03	0.017	2798	0.03	0.17	2798
	Secondary manufacturing industries	0	1	0.04	0.19	2798	0.04	0.20	2798
	Capital intensive tertiary manufacturing	0	1	0.06	0.22	2798	0.06	0.23	2798
	Construction industries	0	1	0.05	0.23	2798	0.06	0.23	2798
	Trans, warehousing, wholesale	0	1	0.16	0.37	2798	0.16	0.36	2798
	Communications and utilities	0	1	0.02	0.13	2798	0.02	0.13	2798
	Retail and consumer service	0	1	0.29	0.46	2798	0.30	0.46	2798
	Finance and insurance industries	0	1	0.07	0.26	2798	0.07	0.26	2798
	Real estate, rental, leasing operations	0	1	0.01	0.09	2798	0.01	0.10	2798
	Business services industries	0	1	0.12	0.33	2798	0.11	0.31	2798
	Education and health services	0	1	0.05	0.21	2798	0.06	0.23	2798
	Information and cultural industries	0	1	0.02	0.14	2798	0.02	0.13	2798
Union cont.	Union coverage ratio	0	1	0.11	0.27	2798	0.16	0.30	2798
Workplace size controls	Workplace size: 10–30 employees	0	1	0.65	0.47	2798	0.63	0.48	2798
	Workplace size: 31–60 employees	0	1	0.19	0.39	2798	0.20	0.40	2798
	Workplace size: 61–100 employees	0	1	0.08	0.27	2798	0.09	0.29	2798
	Workplace size: 101 plus employees	0	1	0.07	0.26	2798	0.08	0.27	2798

NOTE: Bolded font indicates variables that were constructed by the authors. Italicised font the Scale Alpha Score. *Ee, employee.

TABLE 2
DESCRIPTIVE STATISTICS FOR THE INNOVATION MEASURES

Year	Variable	Min	Max	Mean	SD	N
2000	Introduced a new product (1 = yes, 0 = no)	0	1	0.34	0.47	2798
	Introduced an improved product (1 = yes, 0 = no)	0	1	0.43	0.50	2798
	Product innovation dummy	0	1	0.47	0.50	2798
	Introduced a new workplace process (1 = yes, 0 = no)	0	1	0.30	0.46	2798
	Introduced an improved workplace process (1 = yes, 0 = no)	0	1	0.36	0.48	2798
	Process innovation dummy	0	1	0.38	0.49	2798
2002	Introduced a new product (1 = yes, 0 = no)	0	1	0.28	0.45	2798
	Introduced an improved product (1 = yes, 0 = no)	0	1	0.33	0.47	2798
	Product innovation dummy	0	1	0.37	0.48	2798
	Introduced a new workplace process (1 = yes, 0 = no)	0	1	0.20	0.40	2798
	Introduced an improved workplace process (1 = yes, 0 = no)	0	1	0.29	0.45	2798
	Process innovation dummy	0	1	0.30	0.46	2798

NOTE: Bolded font indicates the actual dummy variable used in the analysis.

Measuring Innovation. The propensity to innovate is conceptualized as including two aspects: First, to improve or create a product, and second, to improve or introduce a workplace process.

A measure for each aspect is created in the form of a dummy variable, i.e., a workplace has improved and/or created a new product; a workplace has improved and/or created a new workplace process. Being a dummy variable, it is coded zero for “no” and one for “yes.” The WES has the same innovation variables in all years of the sample. Descriptive statistics for the input variables and the dummies are reported in Table 2.

Measures for Control Variables. Five sets of control variables are created. A measure of the type of employment relationship is created in the form of an averaged ratio of (1) full-time employees to total employees and (2) permanent employees to total employees. A measure of the regularity of the traditional full-time and permanent employment relationship as a control is a new addition to workplace studies. It is warranted given the increased popularity of nonstandard employment contracts and their likely effect on workplace strategy (Jamal 2004). The industry codes are a ten-way classification created for the WES. Union density is calculated as a ratio of all employees covered by a collective agreement to the total number of employees. The number of employees attached to the workplace measures the size of the workplace. Four dummy variables are created as follows: the workplace has ten to thirty employees; thirty-one to sixty employees; sixty-one to one hundred employees; and over one hundred one employees. The last three sets of control variables (industry codes, union density, and workplace size)

are commonly used in workplace level analysis using the WES (see Slotsve and Chaykowski 2003; Verma and Fang 2003; Walsworth 2007). The WES has the same control variables in all years of the sample.

The business strategy of an international workplace is conceptualized as having three main foci: research and development, employee development, and product quality. The business strategy measure is an averaged index of nine variables that ask respondents to rate the importance of various business strategies. The survey responses, ranging from 1 to 6 have been shifted down to range from 0 to 5 and the index has been normalized to also range from 0 to 5. Three of the variables (importance of R&D, importance of developing new products, and importance of developing new production techniques) measure a workplace's focus on research and development. Two of the variables (importance of improving employee skill and importance of increasing employee involvement) measure a workplace's focus on employee development. Four of the variables (importance of total quality management, importance of improving product quality, importance of improving coordination with customers and suppliers, and importance of improving measures of performance) measure a workplace's focus on product quality. The WES only includes these business strategy variables in the 1999 and 2001 data files.

Results

Descriptive statistics for all the variables used in the study except for the innovation index are shown in Table 1, including the scale used for measurement, minimum, maximum, mean, standard deviation, and the sample size for the years 1999 and 2001. Descriptive statistics for the innovation dummies and its components are shown in Table 2. All the composite indices created are generally well justified in terms of their reliability coefficient (α).³

The analysis was carried out in two stages. In the first stage we test the hypothesis that workplaces that are more international in character are likely to have a different approach to HRM policies compared to workplaces that are less international in their orientation. To accomplish this we regressed three workplace practices, variable pay, training, and employee involvement on DWI with controls for size, industry, union status, percent permanent full-time employment, and type of business strategy chosen. These results are shown in Table 3. To ensure the direction of causality, workplace practice variables are used from the 2001 survey while the explanatory variables are taken from the 1999 survey. Within the four years of data (1999–2002)

³ See Table 1.

TABLE 3
OLS REGRESSION ESTIMATES OF THE DWI AND BUNDLING EFFECT ON SELECTED HPWP

	2001	Variable pay		Training		Employee involvement	
1999	Mean	(1)	(2)	(3)	(4)	(5)	(6)
DWI	0.75	0.052*** (0.008)	0.037*** (0.012)	0.052*** (0.009)	0.015** (0.015)	-0.005 (0.009)	0.000 (0.973)
Variable pay (VP)	0.28	NA	NA	0.141*** (0.022)	0.098*** (0.033)	0.102*** (0.022)	0.113*** (0.033)
Training (TR)	0.28	0.096*** (0.020)	0.038 (0.028)	NA	NA	0.069*** (0.021)	0.070** (0.030)
Employee involvement (EI)	0.29	0.168*** (0.020)	0.186*** (0.029)	0.183*** (0.022)	0.176*** (0.031)	NA	NA
DWI*VP	0.21	-	NA	-	0.053* (0.030)	-	-0.013 (0.030)
DWI*TR	0.21	-	0.067*** (0.024)	-	NA	-	-0.002 (0.944)
DWI*EI	0.22	-	-0.028 (0.026)	-	0.007 (0.026)	-	NA
Union density	0.11	-0.149*** (0.020)	-0.152*** (0.020)	0.078*** (0.023)	0.078*** (0.023)	-0.188*** (0.022)	-0.118*** (0.022)
Percent perm. full-time employment	0.86	0.101*** (0.033)	0.101*** (0.033)	-0.024 (0.037)	-0.020 (0.037)	-0.114*** (0.036)	-0.115*** (0.036)
Business strategy	2.74	-0.016** (0.007)	-0.013* (0.007)	0.029*** (0.007)	0.031*** (0.007)	0.059*** (0.007)	0.059*** (0.007)
<i>N</i>		2192	2192	2192	2192	2292	2292
Adjusted <i>R</i> ²		0.189	0.191	0.213	0.221	0.106	0.105
<i>F</i>		29.35***	26.89***	33.96***	30.77***	16.11***	14.50***

NOTE: All regressions include controls for size using a four-way classification and for industry using a ten-way classification. Significance is reported at the 0.01*** level, 0.05** level, and 0.1* level. Standard errors are reported in brackets.

available at the time of this study, other paired years of data are possible for longitudinal analysis. We have estimated this model using other paired years but only the results of the 1999–2001 pair are reported here because of space constraints and also because the main results remain unchanged in other paired years.

In columns 1, 3, and 5 of Table 3, we show the results of a basic model without any interactions. The main result to note here is that DWI has a significant positive impact on variable pay and training even after controlling for all the other factors. The effect of DWI on employee involvement is almost nil: not only is the coefficient insignificant but the point estimate is very small as well. Variable pay and training will rise by nearly 5 percent for each point of increase in the DWI index. In absolute terms, this effect is not very large but it is significant and robust across different specifications.

Other results of note show that union density has a negative impact on the use of variable pay and direct employee participation programs. This is not surprising, given that unions have generally opposed or have been cool to both of these policies. There is also evidence of “bundling” of workplace practices as seen in the significant coefficients of training and employee involvement on variable pay (column 1), of variable pay and employee involvement on training (column 3) and of variable, and training on employee involvement (column 5). These results are generally supportive of the findings of previous studies.

Next, the model was augmented with interaction terms to investigate if workplaces with a high DWI have a significant effect on workplace practices when they also adopt certain other workplace practices. These results are shown in columns 2, 4, and 6, respectively for variable pay, training, and employee involvement. In column 2, results on variable pay are shown in which we enter DWI interactions with training and employee involvement. Although the adjusted R^2 does not increase very much, coefficients of DWI and both interactions are significant and positive suggesting that the effect of DWI on the likelihood of variable pay is even stronger for workplaces that use related practices such as training and Employee Involvement (EI).

Similarly, the result on training, shown in column 4, suggests that DWI increases the likelihood of adopting training directly but it also does so indirectly by increasing the likelihood of adopting variable pay. DWI interaction with EI was not significant. Lastly, the results on EI, shown in column 6, show that DWI had no significant effect, directly or indirectly, through the interactions.

These results are fairly robust across different years and specifications. They provide strong support for the hypothesis that “international” workplaces are different from the domestic ones in that they are more likely to adopt certain HR practices such as variable pay and training. While this finding is significant in increasing our understanding of the effect of globalization on a firm’s choice of HR policies, by itself it does not explain why firms do so. We have argued and speculated earlier that this may be due to the higher competition they face in the international arena. To test this proposition, it is necessary to show that the adoption of these HR practices would lead to outcomes that are important to workplaces competing internationally. Unless we show such a link, it is not clear why an “international” workplace would be more likely to adopt HR practices such as variable pay and training.

In the next phase of the analysis, we investigate the proposition that “international” workplaces that adopt certain HR practices are more likely to be innovators in terms of new and improved workplace processes and

TABLE 4
OLS REGRESSION ESTIMATES OF THE DWI AND HPWP EFFECT ON PRODUCT INNOVATION

	Product innovation					
	2000			2002		
	1999 Mean	(1)	(2)	2001 Mean	(3)	(4)
DWI	0.75	0.067*** (0.016)	0.160*** (0.026)	0.79	-0.028 (0.017)	-0.049 (0.036)
Variable pay (VP)	0.28	0.098** (0.039)	0.289*** (0.060)	0.27	-0.051 (0.038)	-0.187*** (0.060)
Training (TR)	0.28	0.026 (0.039)	-0.067 (0.058)	0.25	0.161*** (0.033)	0.177*** (0.047)
Employee involvement (EI)	0.29	0.167*** (0.039)	0.313*** (0.056)	0.25	0.276*** (0.035)	0.341*** (0.050)
DWI*VP	0.21	—	-0.226*** (0.054)	0.21	—	0.149*** (0.050)
DWI*TR	0.21	—	0.110** (0.049)	0.20	—	-0.004 (0.043)
DWI*EI	0.22	—	-0.177*** (0.051)	0.20	—	-0.087* (0.050)
Union coverage	0.11	0.084** (0.040)	0.080** (0.040)	0.16	-0.025 (0.031)	-0.033 (0.031)
Percent perm. full-time employment	0.86	0.183*** (0.065)	0.149** (0.065)	0.86	-0.018 (0.067)	-0.016 (0.067)
Business strategy	2.74	0.116*** (0.013)	0.109*** (0.013)	2.63	0.106*** (0.012)	0.105*** (0.012)
<i>N</i>		2192	2192		2553	2553
<i>R</i> ²		0.121	0.125		0.102	0.098
<i>F</i>		15.67***	15.17***		15.14***	13.62***

NOTE: All regressions include controls for size using a four-way classification and for industry using a ten-way classification. Significance is reported at the 0.01*** level, 0.05** level, and 0.1* level. Standard errors are reported in brackets. The adjusted *R*² is reported.

products. We regress a workplace's propensity to innovate on DWI and HR practices along with appropriate controls. These results are shown in Table 4 for product innovation and in Table 5 for process innovation. To establish causality, we use explanatory variables from the base year, 1999, and the innovation index, our dependent variable, in the subsequent year, 2000. Since our variables of interest were measured again in 2001, we repeat our regressions with the explanatory variables from 2001 regressed on innovation in 2002. It allows us to examine the robustness of our main results.

For product innovation, results for the 1999–2000 paired years are shown in Table 4 in columns 1 and 2 and for the 2001–2002 paired years, in columns 3 and 4. The basic model, without interactions, is shown in columns 1 and

TABLE 5
OLS REGRESSION ESTIMATES OF THE DWI AND HPWP EFFECT ON PROCESS INNOVATION

	Process innovation					
	2000			2002		
	1999 Mean	(1)	(2)	2001 Mean	(3)	(4)
DWI	0.75	0.031** (0.016)	0.035 (0.026)	0.79	0.030* (0.016)	0.076*** (0.025)
Variable pay (VP)	0.28	0.009 (0.038)	0.008 (0.059)	0.27	0.020 (0.036)	0.014 (0.057)
Training (TR)	0.28	0.185*** (0.038)	0.193*** (0.057)	0.25	0.057* (0.031)	0.067 (0.044)
Employee involvement (EI)	0.29	0.130*** (0.078)	0.132** (0.055)	0.25	0.300*** (0.033)	0.427*** (0.047)
DWI*VP	0.21	—	0.001 (0.999)	0.21	—	0.010 (0.048)
DWI*TR	0.21	—	−0.009 (0.048)	0.20	—	0.001 (0.041)
DWI*EI	0.22	—	−0.002 (0.051)	0.20	—	−0.171*** (0.047)
Union coverage	0.11	0.032 (0.039)	0.032 (0.039)	0.16	−0.076** (0.030)	−0.076** (0.030)
Percent perm. full-time employment	0.86	−0.191*** (0.063)	−0.191*** (0.064)	0.86	−0.104* (0.063)	−0.117* (0.063)
Business strategy	2.74	0.096*** (0.013)	0.096*** (0.013)	2.63	0.063*** (0.011)	0.063*** (0.011)
<i>N</i>		2192	2192		2553	2553
<i>R</i> ²		0.128	0.119		0.097	0.101
<i>F</i>		16.78***	14.47***		15.04***	14.03

NOTE: All regressions include controls for size using a four-way classification and for industry using a ten-way classification. Significance is reported at the 0.01*** level, 0.05** level, and 0.1* level. Standard errors are reported in brackets. The adjusted *R*² is reported.

3, while columns 2 and 4 show the same model augmented with DWI interactions with the three HR practices. The DWI coefficient is significant in the main model and the interactive model, indicating a positive main effect in the 1999–2000 period. Thus, higher product innovation is reported by more international workplaces. This effect is insignificant in the 2001–2002 period. Of the HR practices, EI appears to have the strongest, positive, and significant effect on product innovation. In fact, as we show in our results on process innovation (Table 5), EI remains the most influential HR practice in spurring innovation. Training also appears to have a positive impact on both product (in 2001–2002) and process innovation (in 1999–2000). The results here are not as consistent as in the case of EI. Training

effects are not significant in 1999–2000 for product innovation and only mildly significant ($p \leq 0.10$) for process innovation in 2001–2002.

The interactive effects are less consistent by HR practice and across the years. For product innovation (Table 4), the DWI interaction with variable pay is negative in 1999–2000 but turns positive in 2001–2002. It is insignificant for process innovation in both years (Table 5). The interaction with training is significant only for product innovation in 1999–2000 and insignificant in all other models including Table 5 on process innovations. The interaction with EI is consistently negative in three out of four equations in Tables 4 and 5, suggesting that EI is less important to international workplaces for innovation.

The effect of unionization was positive on product innovation in 1999–2000 but insignificant in 2001–2002. However, this effect on process innovation was negative, suggesting that in the presence of unions, employers find it harder to introduce process innovations that may involve changes in work hours or methods. In both Tables 4 and 5, the coefficient of unionization on innovation is small (7–8 percent). The fraction of permanent, full-time employees was positively related to product innovation in 1999–2000 but it was insignificant in 2001–2002 and its effect was generally negative on process innovation (Table 5). The latter suggests that a high fraction of permanent, full-time staff may make it difficult to introduce changes in work methods and hours. Lastly, adoption of certain business strategies was consistently, significantly, and positively related to both product and process innovations.

These results on the effects of internationalization and HR practices to innovation may be used to conclude that the degree of internationalization appears to be positively related to innovation. Of HR practices, EI has the most positive and consistent effect on innovation. Training effects are similar but not as consistent across the various models while the effects of variable pay are even less consistent. The effect of unionization is positive on product innovation but negative on process innovation.

Summary and Conclusions

These findings, on the surface seem to contradict some recent studies that suggest international firm's de-emphasis HPWP. For example, Cooke (2007) argues that national borders serve as barriers for diffusing HPWP across an international firm and that workforces located in different countries in the same firm are too divers for uniform HPWP to be effective. This apparent contradiction likely serves as an endorsement for the DWI index as an improved proxy of internationalization. Cooke, like many researchers, uses a single

observable criterion to serve as a measure of internationalization: A firm that manufactures components in more than one country is considered a multinational firm or in other words an international firm. Instead of measuring international engagement, as the DWI index is argued to do, Cooke is measuring geographic homogeneity. To illustrate the implication, consider a firm that manufactures all components in a single country that is suddenly faced with stiff competition from firms that make use of multiple countries to manufacture components. This firm may respond by copying the practices of the international competition in hopes of achieving similar or even better results than the competition. Traditional measures of internationalization, such as the one used by Cooke, classifies this firm as domestic even after it adjusted its practices to the sudden appearance of international competition. In contrast, the DWI index incorporates the importance of international competition as one of several indications that a firm is engaged with the international environment. It follows that the added sensitivity of the DWI index over traditional measures explains the greater link found between internationalization and HPWP.

This study provides further evidence that treating various HPWP as a homogenous group can be problematic. Although there is some evidence of a “bundling” effect within the HPWP, the DWI seems unrelated to employee-involvement schemes, while variable pay and training programs have a stronger relationship to internationalization. Along the same lines, various components of HPWP had different impacts on a workplace’s propensity to innovate. More workplace-level research is needed to investigate the differences across various HPWP. In this study, conceptual training appears to increase an international workplace’s likelihood of introducing innovations while variable pay schemes appear to decrease the likelihood of innovations. Although the intent of this study was not to focus on HPWP primarily, it nonetheless points to the need to do so. A manager operating in an international environment should be wary of adopting different HR policies under the assumption that each has a similar effect. This study shows that for international workplaces, training is good for innovation while variable pay and employee involvement have less impact. In other words, each component of HPWP should be analyzed separately for their effects on innovation in the context of “internationalized” workplaces.

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